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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/808,657

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Hajime Kanazawa

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EXAMINER

LEE, SHUN K

ART UNIT

PAPER NUMBER

2884

DATE MAILED: 09/08/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/808,657

Applicant(s)

KANAZAWA ET AL.

Examiner

Shun Lee

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on 14 July 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5, 8, 11 and 12 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5, 8, 11 and 12 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 25 March 2004 and 14 July 2006 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>20060714</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Drawings

1. The drawings were received on 14 July 2006. These drawings are acceptable.

Drawings

2. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the limitation "a second mirror and a second photoelectric conversion element corresponding to the second mirror, a direction of light reflected by the first mirror is orthogonal to a direction of light reflected by the second mirror, and each of the incident angles of the light upon the first and second mirrors is approximately equal to a Brewster angle for the light" must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet"

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or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

3. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 2, 3, and 5 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

It should be noted that a claim may be rendered indefinite by reference to an object that is variable (MPEP § 2173.05(b)).

In regard to claim 2 which is dependent on claim 1, a limitation in the claim to a light intensity detector unit that recited "in a range where a solid angle viewed from the light intensity detector unit to a condensed point of the light is below 0.024 steradians" is indefinite because the relationship of parts was not based on any known standard for sizing the light intensity detector unit input aperture to the condensed point of the light, but on the unspecified distance from the light intensity detector unit to the condensed

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point of the light. Steradian is defined as the solid angle of a sphere subtended by a portion of the surface whose area is equal to the square of the sphere's radius. Thus 0.024 steradians would require the light intensity detector unit input aperture to increase as the distance from the light intensity detector unit to the condensed light point increases.

In regard to claim 3 (which is dependent on claim 1) and claim 5 (which is dependent on claim 3), a limitation in the claim to light intensity detector units that recited "the light intensity detector unit is arranged on a spherical surface that has a center at a condensed point" is indefinite because the relationship of parts was not based on any known standard for arranging the light intensity detector units, but on the unspecified distance from the light intensity detector units to a condensed point of the light.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

7. Claim 11 is rejected under 35 U.S.C. 102(e) as being anticipated by Berger (US 6,781,135).

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In regard to claim **11**, Berger discloses (column 6, lines 5-26; Figs. 1 and 2) a light intensity distribution measuring method for measuring a light intensity distribution of light with a wavelength of 20 nm or smaller (column 1, lines 39-42) emitted from a light source, said light intensity distribution measuring method using a light intensity detector unit (60) that includes a mirror (70) and a photoelectric conversion element (72) which are arranged so that an incident angle (e.g., 45°; column 5, line 66 to column 6, line 1) of the light upon the mirror is approximately equal to a Brewster angle for the light, and said light intensity distribution measuring method measuring the light intensity of the light reflected by the mirror (70). Berger also discloses (column 2, lines 2-7) that light source is e.g., an EUV discharge source which provides incoherent EUV radiation. Incoherent radiation have different directions of polarization by approximately 90° at approximately the same position in the light.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was

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not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

10. Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Berger (US 6,781,135) in view of Kantsyrev *et al.* (US 6,389,107).

In regard to claim 1, Berger discloses (column 6, lines 5-26; Figs. 1 and 2) a light intensity distribution measuring apparatus for measuring a light intensity distribution in light with a wavelength of 20 nm or smaller (column 1, lines 39-42) emitted from a light source, said light intensity distribution measuring apparatus comprising plural light intensity detector units (60) each including a mirror (70) and a photoelectric conversion element (72), said light intensity distribution measuring apparatus measuring the light intensity distribution so that each of incident angles of the light incident upon the mirror (70) is a predetermined angle (*i.e.*, "calibrated angle"; column 5, lines 26-49), wherein the incident angle of the light upon the mirror (70) is approximately equal to 45° (column 5, line 66 to column 6, line 1) for the light in each of the plural light intensity distribution detector units (*i.e.*, "Detectors of the present inventor were positioned so that each bore of the housing of the detector was oriented facing the radiation source"; column 6, lines 21-23). The apparatus of Berger lacks an explicit description that 45° is approximately equal to a Brewster angle and wherein each of the light intensity detector units is rotatable by approximately 90° while maintaining an incident direction of the EUV light upon the light intensity detector unit. Kantsyrev *et al.* teach (column 1, lines 18-67) that the total polarization angle (Brewster's angle) for EUV is typically between 41 to 49

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degrees and to rotate detector in unison with a reflective surface oriented at Brewster's angle, in order to measure degree of polarization. Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to provide $\sim 90^\circ$ rotatable light intensity detector units in the apparatus of Berger, in order to measure degree of polarization.

11. Claims 2-5 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Berger (US 6,781,135) in view of Kantsyrev *et al.* (US 6,389,107) as applied to claim 1 above, and further in view of Stuik *et al.* (Absolute calibration of a multilayer-based XUV diagnostic, Nuclear Instruments & Methods in Physics Research A, Vol. 492, no. 1-2 (11 October 2002), pp. 305-316).

In regard to claim 2 which is dependent on claim 1 in so far as understood, the modified apparatus of Berger lacks an explicit description that the photoelectric conversion element measures the light intensity in a range where a solid angle viewed from the light intensity detector unit to a condensed point of the light is below 0.024 steradians. However, Berger also discloses (column 5, lines 26-49) to provide multilayer mirrors which are designed to reflect light having the desired properties (e.g., angular bandwidth). Further, multilayer mirrors are well known in the art. For example, Stuik *et al.* teach (section 3.6 on pg. 310) to use a well defined area on the mirror which would allow a collection angle of $\sim 8.40 \mu\text{sr}$ for the mirror which is typically located at a distance of ~ 116.5 cm from the source. Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to provide a solid angle (e.g., below 0.024 steradians) viewed from the light intensity detector unit to a condensed

point of the light in the modified apparatus of Berger, in order to use only a well defined area of the mirror.

In regard to claims 3 and 5 (which are dependent on claim 1 in so far as understood) and claim 4 (which is dependent on claim 1), the modified apparatus of Berger lacks an explicit description that the plural light intensity detector units are arranged on a plane arranged in the light or on a spherical surface that is rotatable around an optical axis of the light and has a center at a condensed point defined by the light source which condenses the light emitted at an emission point and diverges the light at a predetermined divergent angle. However, Berger also discloses (column 6, lines 5-27) to position detectors so that each bore was oriented facing the source. Further, Stuik *et al.* teach (section 1 on pg. 305-306) that each source possesses specific spatial distribution, repetition rate, and stability. Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to arrange a finite set of detectors onto a surface which faces the source and to repetitively measure the light at different measurement positions (e.g., by rotation of the finite set of detectors around an optical axis of the light) in the light in the modified apparatus of Berger, in order to determine specific spatial distribution, repetition rate, and stability of a source.

In regard to claim 8 which is dependent on claim 1, the modified apparatus of Berger lacks a second photoelectric conversion element corresponding to a second mirror, a direction of light reflected by the first mirror is orthogonal to a direction of light reflected by the second mirror, and each of the incident angles of the light upon the first and second mirrors is approximately equal to a Brewster angle for the light. However,

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Berger also discloses (column 6, lines 5-27) to position detectors so that each bore was oriented facing the source. Further, Stuik *et al.* teach (section 1 on pg. 305-306) that each source possesses specific spatial distribution, repetition rate, and stability.

Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to provide plural photoelectric conversion elements corresponding to respective plural mirrors in the light in the light intensity detector units of the modified apparatus of Berger, in order to simultaneously determine degree of polarization, specific spatial distribution, repetition rate, and stability of a source.

12. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Berger (US 6,781,135) in view of Stuik *et al.* (Absolute calibration of a multilayer-based XUV diagnostic, Nuclear Instruments & Methods in Physics Research A, Vol. 492, no. 1-2 (11 October 2002), pp. 305-316).

In regard to claim 12 which is dependent on claim 11, the method of Berger lacks an explicit description of repetitively measuring the light at different measurement positions in the light. However, Berger also discloses (column 2, lines 2-7) that EUV sources are known and further that new EUV sources are being developed. Further, Stuik *et al.* teach (section 1 on pg. 305-306) that each source possesses specific spatial distributions, repetition rate, and stability. Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to repetitively measure the light at different measurement positions in the method of Berger, in order to determine specific spatial distributions, repetition rate, and stability of a source.

Response to Arguments

13. Applicant's arguments filed 14 July 2006 have been fully considered but they are not persuasive.

Applicant argues that one of ordinary skill in the art would be apprised of the scope of these claims (MPEP § 2173.05(b)) since examples are described on page 14 and Fig. 1. Examiner respectfully disagrees. Claims 2, 3, and 5 are directed to an apparatus. In the use of the claimed apparatus when it is placed at a distance d_1 from a condensed light point, the light intensity detector unit input aperture a_1 results in a solid angle viewed from the light intensity detector unit to a condensed light point is below 0.024 steradians and wherein the light intensity detector unit is arranged on a spherical surface that has a center at the condensed light point. However when the same claimed apparatus is placed at a distance d_2 from the same condensed light point, the solid angle viewed from the light intensity detector unit to a condensed light point is more than 0.024 steradians and wherein the light intensity detector unit is not arranged on a spherical surface that has a center at a condensed light point. That is, claims 2, 3, and 5 recite structural limitations which depend on a variable d that is not determined until a user uses the apparatus by disposing the apparatus a distance d from the condensed light point. Therefore, claims 2, 3, and 5 are indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Applicant's arguments (second and third paragraphs on pg. 8 of remarks filed 14 July 2006) with respect to amended claims have been considered but are moot in view of the new ground(s) of rejection.

In regard to claim 11, applicant argues (last paragraph on pg. 8 to first paragraph on pg. 9 of remarks filed 14 July 2006) that Berger is silent as to an incident angle of the light upon the mirror being approximately equal to a Brewster angle for the light since Berger discusses the angle that light is reflected, not the incidence angle of the light upon the mirror. Examiner respectfully disagrees. The well known optical law of reflection indicates that the angle of incidence on a reflector is equal to the angle of reflection from the reflector (e.g., see column 10, lines 24-28 of US 3,877,802). Therefore, a 45° incident angle is implicit within Berger disclosure of a 45° reflection angle.

Conclusion

14. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. US Patent 3,877,802 (Greenspan) discloses (column 10, lines 24-28) all conventional planar reflectors follow the well known optical law of reflection which, simply stated, is that the angle of incidence on a reflector is equal to the angle of reflection from the reflector.

15. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.


16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shun Lee whose telephone number is (571) 272-2439. The examiner can normally be reached on Monday-Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Porta can be reached on (571) 272-2444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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